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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,546	09/12/2003	Mitsuaki Tamura	50395-216	6424

7590 07/01/2004

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600 13th Street, N.W.  
Washington, DC 20005-3096

EXAMINER
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LAVARIAS, ARNEL C

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 07/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/660,546

**Applicant(s)**

TAMURA ET AL.

**Examiner**

Arnel C. Lavarias

**Art Unit**

2872



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 4-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☒ Certified copies of the priority documents have been received in Application No. 09/921,562.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/12/03</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. The amendments to the title and specification of the disclosure in the submission dated 9/12/03 are acknowledged and accepted.
2. The cancellation of Claims 1-3 in the submission dated 9/12/03 is acknowledged and accepted.

### ***Election/Restrictions***

3. It is noted that the pending claims of the instant application are drawn to Species 2, an optical device comprising a rod-shaped member, first members constituting a pair of arm parts, second members adhered to the first members, and the rod-shaped member and the piezoelectric element having a substantially equal thermal expansion coefficient, as set forth in the restriction requirement of the parent case 09/921,562. Since pending Claims 4-9 in the instant case are drawn to Species 2, these claims will be examined.

### ***Priority***

4. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 09/921,562, filed on 8/6/01.

### ***Drawings***

5. The drawings were received on 9/12/03. These drawings are acceptable.

### *Specification*

6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to *a single paragraph on a separate sheet within the range of 50 to 150 words*. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

7. The abstract of the disclosure is objected to because of the following informalities:

Abstract has more than 1 paragraph.

Abstract is longer than 150 words.

Correction is required. See MPEP § 608.01(b).

### *Claim Objections*

8. Claims 4-9 are objected to because of the following informalities:

Claims 4 and 9 recite the limitation "the optical axis" in line 3 of each claim. There is insufficient antecedent basis for this limitation in the claim. It is additionally unclear which optical element, i.e. the optical fiber or the diffraction grating, is being referred to as having the optical axis. Claims 5-8 are dependent on Claim 4, and hence inherit the deficiencies of Claim 4.

Claims 4 and 9 recite the feature ‘...the other ends (i.e. opposite the ends to which said optical fiber is fixed)...’ is not proper due to the use of ‘(i.e. opposite the ends to which said optical fiber is fixed)’. It is suggested that the feature above be rewritten as ‘...the other ends opposite to the ends to which said optical fiber is fixed...’, or other suitable language to place these claims in proper form. Claims 5-8 are dependent on Claim 4, and hence inherit the deficiencies of Claim 4.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. (U.S. Patent No. 5889901), of record, in view of Jin et al. (U.S. Patent No. 6370310).

Anderson et al. discloses an optical device (See 47 of Figure 1) comprising an optical fiber having a given length of diffraction grating formed in the direction of the optical axis thereof (See 48 and 21 of Figure 1), a rod-shaped piezoelectric element (See 27 of Figure 1), a means for applying a voltage to said piezoelectric element (See 85 in Figure 1), a rod-shaped member (See lower portion 47 of 120 in Figure 1), first members constituting a pair of arm parts (See extended portions 119, 121 of 120 in Figure 1), and second members adhered to said first members (See 30 in Figure 1); said optical fiber

being fixed to the ends of said pair of arm parts of said first members such that the diffraction grating of said optical fiber is positioned between the ends of said pair of arm parts of said first members (See 120, 121, 48 of Figure 1), said rod-shaped member being fixed to the other ends of said first members (See 47, 119, 121 in Figure 1), said rod-shaped member and said pair of arm parts of said first members constituting a U-shaped member, said piezoelectric element being fixed to said first members so as to be connected to said pair of arm parts at their intermediate points (See 27, 119, 121 in Figure 1), said second members being adhered to the first members longitudinally on the side opposite to the side to which both said piezoelectric element and said rod-shaped member are fixed (See 30 in Figure 1); wherein said rod-shaped member and said piezoelectric element each have a thermal expansion coefficient, and said second members are made of a material, such as PZT, having a thermal expansion coefficient. Anderson et al. lacks the rod-shaped member and said piezoelectric element having a substantially equal thermal expansion coefficient, and said second members being made of a material having a thermal expansion coefficient that is either lower or larger than that of the first members. However, Jin et al. teaches a fiber optic grating temperature compensation device (See for example Figure 1), which is similar in principle to that of Anderson et al. In particular, Jin et al. sets forth the basic theoretical basis (See col. 5, line 54-col. 7, line 53) for the movement of the first members (See extensions in 18 of Figure 1) based on the coefficient of thermal expansions of the two rod shaped elements (See 16, 49 in Figure 1). It is clear from the discussion that, although the thermal expansion coefficient of the two rods should be different to provide relative movement for the first members,

the thermal expansion coefficients may be substantially equal to each other to minimize such relative movement of the first members. Further, Jin et al. teaches that the materials comprising the rod shaped elements and the first and second members may be of any number of particular materials (See col. 60, line 5-col. 6, line 20), including Invar, aluminum, or a ceramic, which allows one skilled in the art to choose appropriate materials with appropriate material coefficient of thermal expansions for the apparatus. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the rod-shaped member and said piezoelectric element have a substantially equal thermal expansion coefficient, and said second members be made of a material having a thermal expansion coefficient that is lower or larger than that of the first members, as taught by Jin et al., in the optical device of Anderson et al., for the purpose of adjusting the sensitivity of the grating to the applied stress generated by changes in temperature.

11. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. in view of Jin et al.

Anderson et al. in view of Jin et al. discloses the invention as set forth above, except for the first members being specifically Invar or aluminum, the second members being specifically aluminum alloy, or the rod-shaped member being a piezoelectric element. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first members be specifically Invar or aluminum, the second members be specifically aluminum alloy, or the rod-shaped member be a piezoelectric element, since it has been held to be within the ordinary skill of worker in

the art to select a known material on the basis of its suitability for the intended use. One would have been motivated to have the first members be specifically Invar or aluminum, the second members be specifically aluminum alloy, or the rod-shaped member be a piezoelectric element, to provide mechanical strength rigidity to the optical device, while allowing for adjustable coefficients of thermal expansion for the various materials comprising the optical device. *Sinclair & Carrooll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

12. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. in view of Jin et al. as applied to Claim 4 above, and further in view of Carome (U.S. Patent No. 5140155).

Anderson et al. in view of Jin et al. discloses the invention as set forth above, except for the second members being adhered to the first members longitudinally on the side to which both said piezoelectric element and said rod-shaped member are fixed. However, Carome teaches a fiber optic sensor utilizing a pair of bimorph cantilever beams (See for example Figures 11-12), wherein the first members and second members (See for example 40/38 on lower or upper portion of optical fiber 20 in Figure 11) are placed with respect to each other to provide appropriate deflection of the cantilever beam on application of, for example, temperature. For example, Figure 6 shows the first member 40 and the second member 38 positioned to provide deflection in one direction, and Figure 7 shows the first member 40 and the second member 38 positioned to provide deflection in the opposite direction when the same applied temperature is applied (See col. 3, line 64-col. 6, line 46). Therefore, it would have been obvious to one having



ordinary skill in the art at the time the invention was made to have the second members being adhered to the first members longitudinally on the side to which both said piezoelectric element and said rod-shaped member are fixed, as taught by Carome, in the optical device of Anderson et al. in view of Jin et al., to reduce space taken up by the optical device, as well as allow for flexibility in placement of the second members based on the design of the optical device.

### ***Conclusion***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 8:30 AM - 5 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2872

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Arnel C. Lavarias  
6/10/04



**THONG NGUYEN**  
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